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blast containment structure

Protecting people and buildings from blast hazards

Ordnance cleanup relies on one of two options. If the item can be rendered safe, it is removed to a disposal site. If the item cannot be rendered safe, it is detonated in place. Containment structures are used for onsite destruction when open detonation is deemed unsafe.

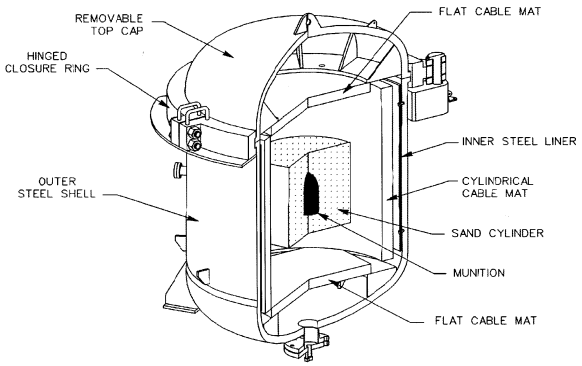
Performance Capability The blast containment structure is designed to capture all significant blast pressures for a total net explosive weight of up to 6 pounds of TNT. It is also designed to capture all fragments from cased munitions. For fragments, the munitions design group included the 57-mm and 75-mm recoilless rifle shells, 75-mm howitzer, and 60-mm and 81-mm mortars. The container will capture all fragments from those and any munitions with similar fragmentation characteristics.

Construction The container is a steel cylinder, 6 feet tall and 3-1/2 feet in diameter, with elliptical top and bottom caps. The top cap is removable and is held in place by a hinged steel ring. The bottom cap is permanently welded to the cylinder, but it features a 4-inch diameter drain port for cleanout and several 1-inch diameter vent holes. The entire container is mounted on a steel framed skid. The skid includes a working platform, made of fiberglass grating, and a hoist for removing the top cap. All steel parts are cabled together to be electrically continuous and are grounded, which eliminates the risk of a spark.

From the outside, the container looks a lot like most commercially available containers used by law enforcement agencies. However, none of those containers are effective at stopping the high-velocity, penetrating fragments produced by cased munitions. The onsite container uses an innovative, yet simple, multi-layer fragment capture system to prevent any fragments from escaping. The system starts with a sand-filled plastic cylinder in which the ordnance and booster charge are placed. The sand layer all around the munition greatly reduces the velocity of the fragments. Just outside the sand layer, plastic bags filled with water are used to absorb much of the heat of the explosion and reduce

the blast pressures. Also outside the sand layer is a steel cable mat. That mat, similar to blasting mats used on construction sites, is formed in the shape of the cylinder, with a top and bottom mat to protect the end caps. The mat intercepts the majority of the fragments. It is also configured to be far enough from the explosives that it suffers little damage from the blast. Next, outside the cable mat is a steel plate liner, located just inside the outer steel shell. This liner is made in easily removable segments and is thick enough to stop any fragments that pass through the cable mat. Using this system, the fragments from the design munition never reach the outer shell. This system provides complete capture of the fragments and ensures a virtually unlimited life of the outer container with no fragment penetration.

Although the system may sound complicated, all layers of the fragment capture system can be easily replaced. The sand and water, obviously, will be replaced after each detonation. The cable mats are expected to last up to ten shots, and the liner plate may survive as many as 50 to 75 shots before it needs to be replaced. Anticipated preparation time between detonations is 30 to 40 minutes.



Testing The development of this container included extensive testing of individual components and a complete, all-up proof test of the entire system. The proof test used a total 6-pound equivalent TNT charge. To provide fragments, part of the charge came from three M306A1's (57-millimeter recoilless rifle shells). In the proof test, blast pressures were held within the container. As the pressure vented from the container, the sound level at 75-feet from the container was only 104 decibels, and there was no measurable overpressure. No fragments escaped from the container.